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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/821,220	03/29/2001	Atsushi Kikuchi	09792909-4863	5401

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EXAMINER

DO, CHAT C

ART UNIT	PAPER NUMBER
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2124

DATE MAILED: 02/06/2004

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/821,220

Applicant(s)

KIKUCHI ET AL.

Examiner

Chat C. Do

Art Unit

2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03/29/01;6/07/01;8/13/01;12/4/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species of the claimed invention:

- a. Species I: Claims 1-8 and 17-24 direct to a Fast Fourier Transform device.
- b. Species II: Claims 9-16 and 25-32 direct to a Discrete Cosine Transform device.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

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2. Applicant's election without traverse of Species I in Paper No. 6 filed 12/4/2003 is acknowledged.

Information Disclosure Statement

3. The listing of references in the specification as seen in pages 2-3 is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

4. Figures 1 and 2A-2B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

5. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

6. The abstract of the disclosure is objected to because the abstract exceeds 150 words in length. Correction is required. See MPEP § 608.01(b).

7. Claims 1-8 and 17-24 are objected to because of the following informalities: all the expressions in claims 1-8 and 17-24 must be re-written for clarification in general, e.g. expressions " $N/(2^m)$ " in line 1 and " $N/(2^{(m+2)})$ " in line 14 of claim 1 should replace with " $N/(2^m)$ " and " $N/(2^{m+2})$ " respectively and expression " $(2^m)^n + (2^{(m-1)})$ -1-th sample and the $(2^m)^n + (2^{(m-1)})$ -th sample" in lines 4-5 of claim 2 should replace with " $(2^{mn} + 2^{m-1} - 1)$ -th sample and the $(2^{mn} + 2^{m-1})$ -th sample".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-8 and 17-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 1, the variable "m" in expressions of the claim is indefinite because it does not clearly define what is the variable "m". The limitations "the N samples" in line 2, "the multiplier" in line 6, and "the output signal" in line 9 lack antecedence basis. In

addition, the term "equivalent" in claim 1 is a relative term which renders the claim indefinite. The term "equivalent" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For examination purposes, the examiner considers the variable "m" as number of time of decimation, the limitations "the N samples", "the multiplier", "the output signal" as "N samples", "a multiplier", "an output signal" respectively, and to disregard the term "equivalent".

Re claim 2, the variable "n" in expressions of the claim is indefinite because it does not clearly define what is the variable "n". For examination purposes, the examiner considers the variable "n" as an instant sample and the sample is obtained by summing the half of two consecutive blocks of data.

Re claim 3, the limitation "the polarity" in line 5 lacks an antecedence basis. For examination purposes, the examiner considers the limitation as "a polarity".

Thus, claims 4-8 and 17-24 are also rejected under the same rationale as cited above for being dependent on the rejected claims 1-3 or having similar problem on the rejected claims 1-3.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-8 and 17-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsutsui (U.S. 5,349,549).

Re claim 1, Tsutsui discloses in Figure 2 a signal processing device adapted to multiply the $N/(2^m)$ (wherein $m = 0$ as seen in S02), samples obtained by decimating the N samples of a signal (process from S01 to S02), by a forward transform window and subsequently perform a linear forward transform on the obtained signal (col. 6 lines 43-49) device comprising: a preprocessing means (col. 5 lines 9-12) for performing a predetermined preprocessing operation on the signal obtained by the multiplication using the multiplier of forward transform window; a transform processing means (col. 5 lines 13-16) for performing a processing operation equivalent to a fast Fourier transform on the output signal of preprocessing means; a postprocessing means (col. 5 lines 17-20) for performing a predetermined postprocessing operation on the output signal of transform processing means; and the input signal and the output signal of transform processing means being complex signals having a length of $N/(2^{m+2})$ (col. 5 lines 13-16 as $N/4$ complex numbers).

Re claim 2, Tsutsui further discloses in Figure 1 transform window for the length corresponding to the N samples before decimation has a length corresponding to $N/(2^m)$ samples and is obtained by halving the sum of the $(2^{mn} + 2^{m-1} - 1)$ -th sample and the $(2^{mn} + 2^{m-1})$ -th sample (overlapping samples by 50% as seen in (J-1)-th block and J-th block).

Re claim 3, Tsutsui further discloses preprocessing means produce the following signal from $N/(2^m)$ samples multiplied by forward window; first intermediate signal of $N/(2^m)$ samples, of which n -th sample is obtained by inverting the polarity (col. 21 lines

49-54) of the $n+3N/(2^{m+2})$ -th forward windowed sample for n between 0 and $N/(2^{m+2})-1$, and setting $N/(2^{m+2})$ -th forward windowed sample for n between $N/(2^{m+2})$ and $N/(2^{m+2})-1$ (n being an integer from 0 to $N-1$) (col. 21 lines 35-47); second intermediate signal of $N/(2^m)$ samples, of which n -th sample is obtained by subtracting $N/(2^m)-1-2n$ -th from $2n$ -th sample of first intermediate signal (col. 21 lines 58-68); and complex signal for output equivalent the signal of which n -th sample is a product of $\exp(-2^{m+1}\pi*jn/N)$ and a complex signal of which real part is $2n$ -th sample of second intermediate signal and imaginary part is $2n+1$ -th sample of second intermediate signal (col. 22 lines 1-18).

Re claim 4, Tsutsui further discloses postprocessing means produce the following signal from the $N/(2^{m+2})$ sample output complex signal of transform processing means; third intermediate signal, of which k -th sample is obtained by halving the sum of the k -th and the conjugate of $N/(2^{m+2})-1-k$ -th sample of output complex signal of transform processing means (k -being an integer from 0 to $N/2-1$) (col. 22 line 24 and lines 36-38); fourth intermediate signal of which k -th sample is obtained by dividing 21 and multiplying $\exp(-2^{m+1}\pi*j(2k-i-1)/N)$ by the value subtracted conjugate of $N/(2^{m+2})-1-k$ -th from k -th sample of output complex signal of transform processing means (col. 22 lines 39-44 and lines 47-50); fifth intermediate signal of which k -th sample is obtained by halving the sum of the $N/(2^{m+2})-1-k$ -th and the conjugate k -th sample of output complex signal of transform processing means (col. 22 lines 52-55); sixth intermediate signal, of which k -th sample is obtained by dividing 21 and multiplying $\exp(2^{m+1}\pi*j(2k+1)/N)$ by the value subtracted conjugate of k -th from

$N/(2^{m+2})-1$ -k-th sample of output complex signal of transform processing means (col. 22 lines 45-47); and complex signal for output, equivalent to the signal of which front half is obtained as the real part of the product of $\exp(-(2^m)\pi*j(2k+1)/(2N))$ and the sum of k-th sample of third intermediate signal and k-th sample of fourth intermediate signal, and rear half is obtained as the real part of the product of $j \exp((2^m)\pi*j(2k+1)/(2N))$ and the sum of k-th sample of third intermediate signal and k-th sample of fourth intermediate signal (col. 22 lines 61-63).

Re claim 5, Tsutsui discloses a signal processing device adapted to perform a linear inverse transform on a signal band-limited to $N/2^{m+1}$ samples out of $N/2$ samples and multiply the signal obtained by the linear inverse transform by an inverse transform window to produce $N/2^{m+1}$ independent signals (col. 5 lines 21-44), device comprising; a preprocessing means (col. 5 lines 34-37) for performing a predetermined preprocessing operation on the band-limited signal; a transform processing means (col. 5 lines 37-41) for performing a processing operation equivalent to a fast Fourier transform on the output signal of preprocessing means; a postprocessing means (col. 5 lines 41-45) for performing a predetermined postprocessing operation on the output signal of transform processing means; and the input signal and the output signals of transform processing means being complex signals having a length of $N/(2^{m+2})$ (col. 5 lines 37-41).

Re claim 6, Tsutsui further discloses preprocessing means produce the following signal from band-limited $N/(2^{m+1})$ samples; first intermediate signal (col. 24 lines 21-31) of which k-th sample is obtained by setting the 2k-th band-limited sample for k

between 0 and $N/(2^{(m+2)})-1$, and inverting the polarity of the $N/(2^m)-1-2k$ -th band-limited sample for k between $N/(2^{(m+2)})$ and $N/(2^{(m+1)})-1$ (k being an integer from 0 to $N/2-1$); and complex signal for output equivalent to the signal of which k -th sample is a product of $\exp(-2^{(m+2)}\pi*jn/N)$ and a complex signal of which real part is $2k$ -th sample of first intermediate signal and imaginary part is $2k+1$ -th sample of first intermediate signal (col. 24 lines 31-49).

Re claim 7, Tsutsui further discloses postprocessing means produce the following signal from the $N/(2^{(m+2)})$ sample output complex signal of transform processing means; second intermediate signal (col. 24 lines 56-68) of which n -th sample is obtained by halving the sum of n -th and the conjugate of $N/(2^{(m+2)})-1-n$ -th sample of output complex signal of transform processing means (n being an integer from 0 to N); third intermediate signal (col. 25 lines 1-2), of which n -th sample is obtained by dividing $2j$ and multiplying $\exp(-2^{(m+1)}\pi*j(2n+1)/N)$ by the value subtracted conjugate of $N/(2^{(m+1)})-1-n$ -th from n -th sample of output complex signal of transform processing means; fourth intermediate signal (col. 25 lines 3-12), of which n -th sample is obtained by halving the sum of the $N/(2^{(m+2)})-1-n$ -th and the conjugate of the n -th sample of output complex signal of transform processing means; fifth intermediate signal (col. 25 lines 13-17), of which n -th sample is obtained by dividing $2j$ and multiplying $\exp(-2^{(m+1)}\pi*j(2n-1)/N)$ by the value subtracted conjugate of n -th from $N/(2^{(m+2)})-1-n$ -th sample of output complex signal of transform processing means; sixth intermediate signal (col. 25 lines 18-25), equivalent to the signal of which front half is obtained as the real part of the product of $\exp(-(2^{(m+1)}\pi*j(2n+1)/(2N)))$ and the sum of the n -th sample

of second intermediate signal and n -th sample of third intermediate signal, and rear half is obtained as the real part of the product of $-j \exp((2^m \pi j(2n+1)/(2N))$ and the sum of the n -th sample of fourth intermediate signal and n -th sample of fifth intermediate signal; and, signal for output (col. 16 lines 46-47 and col. 18 lines 7-12), equivalent to the signal of which n -th sample is obtained by the $n+N/(2^{m+2})$ -th sample of sixth intermediate signal for n between 0 and $N/(2^{m+2})-1$, inverting the polarity of the $3N/(2^{m+2})-1$ -th sample of sixth intermediate signal for n between $N/(2^{m+2})$ and $3N/(2^{m+2})-1$, and inverting the polarity of the $n-3N/(2^{m+2})$ -th sample of sixth intermediate signal for n between $3N/(2^{m+2})$ and $N/(2^m)-1$.

Re claim 8, Tsutsui further discloses in Figure 1 transform window has a length corresponding to $N/(2^m)$ samples obtained by halving the sum of the $(2^m)n+(2^{m-1})-1$ -th sample and the $(2^m)n+(2^{m-1})$ -th sample for the length corresponding to the N samples without being subjected to any band-limit (wherein the $J-1$ -th block overlaps the J -th block of 50%).

Re claim 17, it is a method claim of claim 1. Thus, claim 17 is also rejected under the same rationale in the rejection of rejected claim 1.

Re claim 18, it is a method claim of claim 2. Thus, claim 18 is also rejected under the same rationale in the rejection of rejected claim 2.

Re claim 19, it is a method claim of claim 3. Thus, claim 19 is also rejected under the same rationale in the rejection of rejected claim 3.

Re claim 20, it is a method claim of claim 4. Thus, claim 20 is also rejected under the same rationale in the rejection of rejected claim 4.

Re claim 21, it is a method claim of claim 5. Thus, claim 21 is also rejected under the same rationale in the rejection of rejected claim 5.

Re claim 22, it is a method claim of claim 6. Thus, claim 22 is also rejected under the same rationale in the rejection of rejected claim 6.

Re claim 23, it is a method claim of claim 7. Thus, claim 23 is also rejected under the same rationale in the rejection of rejected claim 7.

Re claim 24, it is a method claim of claim 8. Thus, claim 24 is also rejected under the same rationale in the rejection of rejected claim 8.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. U.S. Patent No. 5,646,960 to Sonohara et al. disclose an inverse modified discrete cosine transform signal transforming system.
- b. U.S. Patent No. 6,266,687 to Leyonhjelm et al. disclose a flexibility enhancement to the modified fast convolution algorithm.
- c. U.S. Patent No. 5,890,106 to Bosi-Goldberg discloses an analysis-/synthesis filtering system with efficient oddly-stacked singleband filter bank using time-domain aliasing cancellation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (703) 305-5655. The examiner can normally be reached on M => F from 7:00 AM to 4:30 PM.

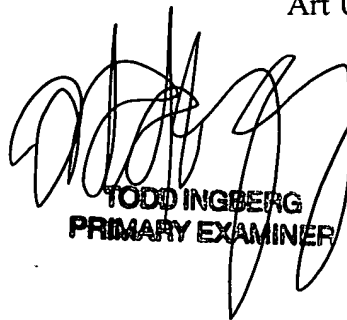
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaki Kakali can be reached on (703) 305-9662. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Chat C. Do
Examiner
Art Unit 2124

January 22, 2004


TODD INGBERG
PRIMARY EXAMINER